

## CLAIMS

- 1 1. A method for managing data volumes from a management terminal in a  
2 distributed computer system having a host computer system with at least one  
3 storage device connected to the computer system by driver software, the method  
4 comprising:  
5 (a) inserting an interface layer between the driver software and the storage  
6 device, the interface layer exporting a platform dependent API and  
7 controlling data passing between the driver software and the storage  
8 device;  
9 (b) running, in the host, management facade software that converts the  
10 interface layer API to platform-independent method calls;  
11 (c) running, in the host, a federated bean that discovers data volumes in the  
12 storage device and generates method calls to the management facade to  
13 control the interface layer; and  
14 (d) controlling the federated bean to display and configure the data volumes.
- 1 2. The method of claim 1 wherein step (d) comprises controlling the federated bean  
2 with a command line interface.
- 1 3. The method of claim 1 wherein step (d) comprises controlling the federated bean  
2 with a graphical user interface.
- 1 4. The method of claim 1 wherein step (a) comprises inserting a SCSI terminal  
2 emulation interface layer between the driver software and the storage device,  
3 which interface layer makes the storage device appear as a SCSI device.
- 1 5. The method of claim 1 wherein step (a) comprises inserting a storage volume  
2 interface layer between the driver software and the storage device, inserting an

3 additional data service interface layer between the storage volume interface layer  
4 and the storage device and using the storage volume interface layer to divert  
5 information passing between the driver software and the storage device to the  
6 additional data service layer.

1 6. The method of claim 1 wherein step (c) comprises:

2 (c1) displaying all data volumes on the host with information regarding the data  
3 volumes displayed in a uniform manner.

1 7. The method of claim 6 wherein the data volumes on the host have various  
2 volume types and step (c1) comprises displaying all data volumes of each  
3 volume type together wherein information regarding each data volume type is  
4 presented in a uniform manner.

1 8. The method of claim 1 further comprising:

2 (e) running a distributed management framework in the computer system, the  
3 distributed management framework having a lookup service; and  
4 (f) using the lookup service to locate the federated bean.

1 9. The method of claim 1 wherein the federated bean maintains a list of users for  
2 each of the data volumes and the method further comprises:

3 (g) registering each user of one of the data volumes with the federated bean  
4 when the each user requests use of the one data volume; and  
5 (h) upon registration, entering the data volume user into a list maintained for  
6 the one data volume.

1 10. The method of claim 1 further comprising:

2 (i) retrieving a list of users for a specific volume from the federated bean; and

3 (j) contacting each user on the list to determine how the each user is using  
4 the specific volume.

1 11. The method of claim 10 wherein each user has a method describing how the  
2 each user is using the specific volume and wherein step (j) comprises contacting  
3 each user on the list and running the method in the each user.

1 12. Apparatus for managing data volumes from a management terminal in a  
2 distributed computer system having a host computer system with at least one  
3 storage device connected to the computer system by driver software, the  
4 apparatus comprising:

5 an interface layer that is inserted between the driver software and the  
6 storage device, the interface layer exporting a platform dependent API and  
7 controlling data passing between the driver software and the storage device;  
8 management facade software in the host that converts the interface layer  
9 API to platform-independent method calls;

10 a federated bean in the host that discovers data volumes in the storage  
11 device and generates method calls to the management facade to control the  
12 interface layer; and

13 a presentation program that controls the federated bean to display and  
14 configure the data volumes.

1 13. The apparatus of claim 12 wherein the presentation program comprises a  
2 command line interface.

1 14. The apparatus of claim 12 wherein the presentation program comprises a  
2 graphical user interface.

1 15. The apparatus of claim 12 wherein the interface layer comprises a SCSI terminal  
2 emulation interface layer that makes the storage device appear as a SCSI  
3 device.

1 16. The apparatus of claim 12 wherein the interface layer comprises:  
2 a storage volume interface layer located between the driver software and  
3 the storage device; and  
4 an additional data service interface layer located between the storage  
5 volume interface layer and the storage device and wherein the storage volume  
6 interface layer is used to divert information passing between the driver software  
7 and the storage device to the additional data service layer.

1 17. The apparatus of claim 12 wherein the federated bean comprises a logical disk  
2 aggregator that retrieves information from all data volumes on the host.

1 18. The apparatus of claim 17 wherein the data volumes on the host have various  
2 volume types and the logical disk aggregator comprises mechanisms that  
3 retrieve information from each volume type.

1 19. The apparatus of claim 12 wherein the computer system has a distributed  
2 management framework with a lookup service running therein; and the apparatus  
3 further comprises a mechanism in the lookup service that locates the federated  
4 bean.

1 20. The apparatus of claim 12 wherein the federated bean comprises a list of users  
2 for each of the data volumes and a mechanism for registering each user of one  
3 of the data volumes with the federated bean when the each user requests use of  
4 the one data volume by entering the data volume user into a list maintained for  
5 the one data volume.

- 1 21. The apparatus of claim 12 wherein the federated bean further comprises a  
2 mechanism that retrieves a list of users for a specific volume from the federated  
3 bean and a mechanism that contacts each user on the list to determine how the  
4 each user is using the specific volume.
- 1 22. The apparatus of claim 21 wherein each user has a method describing how the  
2 each user is using the specific volume and wherein the mechanism that contacts  
3 each user comprises a mechanism for calling the method in the each user.
- 1 23. A computer program product for managing data volumes from a management  
2 terminal in a distributed computer system having a host computer system with at  
3 least one storage device connected to the computer system by driver software,  
4 the computer program product comprising a computer usable medium having  
5 computer readable program code thereon, including:  
6 interface layer program code for insertion between the driver software and  
7 the storage device, the interface layer program code exporting a platform  
8 dependent API and controlling data passing between the driver software and the  
9 storage device;  
10 management facade software that converts the interface layer API to  
11 platform-independent method calls;  
12 federated bean program code that discovers data volumes in the storage  
13 device and generates method calls to the management facade to control the  
14 interface layer; and  
15 a presentation program that controls the federated bean to display and  
16 configure the data volumes.
- 1 24. The computer program product of claim 23 wherein the presentation program  
2 comprises a command line interface.

- 1 25. The computer program product of claim 23 wherein the presentation program  
2 comprises a graphical user interface.
- 1 26. A computer data signal embodied in a carrier wave for managing data volumes  
2 from a management terminal in a distributed computer system having a host  
3 computer system with at least one storage device connected to the computer  
4 system by driver software, the computer data signal comprising:  
5 interface layer program code for insertion between the driver software and  
6 the storage device, the interface layer program code exporting a platform  
7 dependent API and controlling data passing between the driver software and the  
8 storage device;  
9 management facade software that converts the interface layer API to  
10 platform-independent method calls;  
11 federated bean program code that discovers data volumes in the storage  
12 device and generates method calls to the management facade to control the  
13 interface layer; and  
14 a presentation program that controls the federated bean to display and  
15 configure the data volumes.